

### **The search for truly “regolithic” howardites**

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The howardite meteorites are polymict breccias of eucrite (basaltic) and diogenite (orthopyroxenitic) material [1] that likely originate from the asteroid 4 Vesta [2]. The true regolithic nature of the suite is not well defined, with previous research suggesting correlations between Ni and solar wind noble gas contents, and minimal variation in  $\text{Al}_2\text{O}_3$  content [3]. Through combined petrological, compositional and noble gas analyses, we aim to better understand howardite petrological diversity, regolith formation processes on the parent asteroid, and to establish what defines a truly “regolithic” howardite.

Our petrological study of 30 polymict eucrites and howardites has identified regolithic features (e.g. melt clasts, chondrite fragments), used to develop a regolith grading scheme. Bulk major element compositional data have been collected [4], and both trace-element and noble gas analyses are underway. We expect those howardites with regolithic petrological and chemical features to have high abundances of implanted solar wind noble gases.

- [1] Mittlefehldt, D.W. *et al.* (1998) *Rev. Min.* 36: 4.1-4.195. [2] Drake M.J. (2001) *MAPS* 36:501-513. [3] Warren, P.H. *et al.* (2009) *GCA* 73:5918-5943. [4] Mittlefehldt D.W. *et al.* (2010) *41<sup>st</sup> LPSC* #2655.